MARGINAL NOTES

Geological mapping of the Carleton Place area involved the re-examination of the area mapped by Wilson, Liberty and Reinhardt (1973) for the Geological Survey of Canada. The area lies partially within the Ottawa-St. Lawrence Lowland, which is characterized by Paleozoic bedrock transected by a system of normal faults striking northeast to southeast.

The main physiographic feature is the Mississippi River (including Mississippi Lake), which flows generally northward through the map area. The eastern part of the area forms part of the Smiths Falls Limestone Plain (Chapman and Putnam 1951, 1966).

Paleozoic bedrock outcrop is generally abundant within the Smiths Falls Limestone Plain, and consists of areas of pavement (within which quarries have been developed).

Surficial deposits consist of till (which occurs in till plains, drumlinized in places), ice-contact stratified drift, marine (Champlain Sea) clay, sand, and gravel, and Recent alluvial sand and silt and organic bog deposits (Richard 1976).

The Ontario Ministry of Natural Resources (Eastern Region) drilled the following wells within the map area: L-C (CP-1), drilled to a depth of 41.8 m in Ramsay Township, (concession VIII, lot 2) (Powell and Klugman 1979; Rogers 1980, p. 38); and L-D (CP-2), drilled to 22.0 m in Ramsay Township (concession IX, lot 20) (Powell and Klugman 1979). The Ontario Ministry of Transportation and Communications drilled 2 holes to a maximum depth of 10.4 m at locality Carleton Place 28 (CP-3) (Beckwith Township, concession VIII, lot 14) (Magni 1982).

PRECAMBRIAN-PALEOZOIC BOUNDARY

Precambrian rock is exposed in the western part of the map area, and the unconformably overlying Paleozoic rock is exposed in the eastern part. Although a fault contact usually separates Precambrian and Paleozoic outcrop areas, an untaulted contact strikes generally north-south through Mississippi Lake. Bedding in the Paleozoic rock, normally close to horizontal, dips relatively steeply adjacent to contacts with Precambrian rock.

PALEOZOIC STRATIGRAPHY

The logs for the Geological Survey of Canada Lebreton well (drilled in the Ottawa area to the northeast), and for the Ontario Ministry of Natural Resources (Eastern Region) L-C well, indicate that the maximum thickness of Paleozoic rock occurring in the map area is approximately 240 m.

The common occurrence of normal faults within themap area has resulted in the exposure of Paleozoic rock at various levels within the sequence.

Equivalent Paleozoic rock units occur in the Montreal area, and units equivalent to those of the uppermost part of the Ottawa Valley sequence occur in southern Ontario west of the Frontenac Axis. The uppermost units of the Carleton Place area are herein referred to as the Gull River Formation and the Bobcaygeon Formation (Units A to C and Unit D, respectively, of Williams and Wolf 1982, p.133), in support of Liberty's (1967) recommendation that the lithostratigraphic nomenclature of the region to the west of the Frontenac Axis be applied to the Ottawa-St. Lawrence Lowland. It is recommended that the name "Ottawa" be elevated to Group status.

Covey Hill Formation (Cambro-Ordovician)

Feldspathic conglomeratic quartz sandstone unconformably overlying the Precambrian basement, and tentatively assigned to the Covey Hill Formation (Unit 1) as proposed by Williams, Rae and Wolf (1984), occurs in areas to the east but may not exist in the Carleton Place map-area; it does not outcrop, and is absent from both wells (L-C an L-D) drilled into the Precambrian by the Ontario Ministry of Natural Resources (Eastern Region).

Nepean Formation (Cambro-Ordovician)

The Nepean Formation (Unit 2) (Wilson 1946, p.10-12) outcrops in several fault blocks in the eastern part of the Carleton Place map area. The log for drillhole L-C indicates a total thickness of 31.1 m.

The formation consists primarily of medium-grained well sorted quartz sandstone. Fine-grained beds predominate in the upper part of the formation, and interbeds up to a few metres thick of quartz-pebble conglomerate occur. The quartz grains are generally well rounded. The fresh surface is white to light brown, and small rusty spots are common. The weathered surface ranges from pure white to dark brown to brick red, and is usually cream to light brown. The unit is generally medium bedded, but beds range from very thin to massive (up to 2 m thick). Based on the nature of the cementing material, there are two common types of sandstone: a hard quartzite (resulting from secondary quartz overgrowth) and a more friable rock (resulting from calcite cement). Crossbedding is common, and various types of trace fossils occur.

The Nepean Formation is equivalent to the Cairnside Member of the Chateauguay Formation of the Montreal area.

March Formation (Lower Ordovician)

The March Formation (Unit 3) (Wilson 1946, p.12-14) outcrops extensively in the eastern part of the map area. The log for drillhole L-C indicates a total thickness of 8.1 m.

The formation consists of interbedded quartz sandstone, sandy dolostone, and dolostone. The lower contact is the base of the lowermost dolomitic bed, and the upper contact is the top of the uppermost sandy bed. There is a net upward decrease in sand content. Intraformational conglomerate commonly occurs in the lower part of the formation; it consists of clasts of muddy dolostone in a matrix of sandstone or sandy dolostone. The sandstone beds identical in lithology to those of the Nepean Formation, are generally fine- to mediumgrained, weather light brown to light yellowish brown, and include both quartz- and calcite-cemented types. A few thin beds of coarse-grained light green sandstone occur, the green colour being due to minor glauconite (C. Rogers, Petrographer, Ontario Ministry of Transportation and Communications, personal communication 1982). The sandy dolostone and dolostone beds are fine crystalline and weather light grey to brownish grey. The sand grains in the sandy dolostone are coarse. All lithologies are thin to thick bedded. In the dolomitic beds algal mats and stromatolites are common, and abundant gastropod shells occur along some bedding planes.

The March Formation is equivalent to the Norton Creek Member of the Chateauguay Formation of the Montreal area.

Oxford Formation (Lower Ordovician)

The Oxford Formation (Unit 4) (Wilson 1946, p.14-16) outcrops in several fault blocks in the eastern part of the map area. A total thickness of 62.2 m was intersected in the Lebreton well (Williams, Rae, and Wolf 1984).

The formation consists of light to dark grey, thin- to thick-bedded, sublithographic to fine crystalline dolostone. The weathered surface is light grey to buff to reddish brown. Stromatolites and calcite-filled vugs are common.

The Oxford Formation is equivalent to the Beauharnois Formation of the Montreal area.

Rockcliffe Formation (Middle Ordovician)

The Rockcliffe Formation (Unit 5) (Wilson 1946, p.17-19) outcrops in several fault blocks in the eastern part of the map area. A total thickness of 59.4 m was intersected in the Lebreton well (Williams, Rae, and Wolf 1984).

The formation consists of interbedded light greenish grey quartz sandstone and green shale. A basal conglomerate occurs locally, and interbeds of silty dolostone occur in the upper part of the formation.
The Rockcliffe Formation is equivalent to the Laval Formation of the Montreal area.

Gull River Formation (Middle Ordovician)

The Gull River Formation (Unit 6) outcrops in several fault blocks in the eastern part of the map area. A total thickness of 42.7 m was intersected in the Lebreton well (Williams, Rae, and Wolf 1984).

The lower member of the formation corresponds to Unit A and B of Williams and Wolf (1982, p.133); the 2 units are here combined because of their lithological similarity. The member consists of interbedded silty dolostone,lithographic to fine crystalline limestone, shale, and fine-grained calcareous quartz sandstone. A black ostracod-bearing shale approximately 1 m thick described by Raymond (1911, p.190) is the basal bed of the member. The upper contact is the top of the uppermost dolomitic bed.

The upper member of the formation (Unit C of Williams and Wolf 1982) consists of lithographic to fine crystalline limestone. The upper contact of the upper member is the top of the uppermost lithographic bed.

The silty dolostones of the lower member are sublithographic to fine crystalline, calcitic to noncalcitic and thin to thick bedded. Fresh surfaces are pale greenish grey to medium grey, and weathered surfaces are buff to reddish brown. Conchoidal fractures and calcite-filled vugs are common.

The limestones of both members are medium to thick bedded, and intraclasts are common. Oolitic interbeds approximately 50 cm thick occur. Fresh surfaces are brownish grey to dark grey, and weathered surfaces are bluish grey. White calcite 'eyes' commonly occur, resulting in 'birdseye' texture, and the upper beds of the upper member contain abundant *Tetradium*.

The Gull River Formation is equivalent to the Pamelia and Lowville Formations of the Montreal area.

Bobcaygeon Formation (Middle Ordovician)

The Bobcaygeon Formation (Unit 7) (Unit D of Williams and Wolf 1982) outcrops in several fault blocks in the eastern part of the map area. A total thickness of 86.6 m was intersected in the Lebreton well (Williams, Rae and Wolf 1984).

Two members of the formation can be distinguished in the Ottawa-St. Lawrence Lowland. The lower member consists of sublithographic to fine crystalline limestone, and the upper member of calcarenite with interbeds of sublithographic to fine crystalline limestone and shale. Chert occurs throughout as nodules up to 20 cm in diameter, and beds and lenses up to 5 cm thick.

The sub-lithographic to fine crystalline limestones are thin-bedded to massive, and have grey to brownish grey fresh surfaces and bluish to brownish grey weathered surfaces. The calcarenites are thin bedded to massive, and have light to medium grey fresh surfaces and bluish to brownish grey weathered surfaces; crossbedding, intraclasts, and stylolites are common.

The Bobcaygeon Formation is equivalent to the Leray, Ouareau, Mile End, and Deschambault Formations of the Montreal area.

STRUCTURAL GEOLOGY

The map area is transected by a series of steeply dipping normal faults and fault zones (including the Mount St. Patrick fault of Kay 1942) which strike generally northwest. Topographic lows are commonly fault-controlled; examples are the southern part of Mississippi Lake and the course of the Mississippi River in the northern part of the map area. Bedding, normally close to horizontal, often dips steeply adjacent to faults and within fault zones. Fault traces are generally straight but are commonly curved in the vicinity of fault junctions, which often consist of a single fault branching from another fault. Several major fault junctions, involving a larger number of faults, occur in the northeastern part of the area. The displacement at a fault junction is approximately equal to the sum of the displacements along each set of faults which branches from the junction.

Older strata are exposed mainly in fault blocks occurring in the western and southeastern parts of the map area, and younger strata are exposed in fault blocks occurring in the northeastern part of the area. The total fault displacement across the area is at least 240 m.

Different fault blocks commonly have distinctive topographic features. These features include the hummocky topography of the fault blocks in which Precambrian rock outcrops; and the lowlands (in which the Rockcliffe and Gull River Formations outcrop) and uplands (in which the Bobcaygeon Formation outcrops) of the northeastern part of the area.

ECONOMIC GEOLOGY

A few small quarries in the Nepean Formation, including the Mohr quarry (Ramsay Township, concession IX, lot 20) (Rogers 1980, p.65), were once worked as sources of building stone.

The Nepean Formation is a source of silica sand; the Carleton Place (Metcalfe) quarry of Ontario Building Materials Limited (Ramsay Township, concession VII, lot 5) (Hewitt 1963, p.23; Rogers 1980, p.65-66) is a former producer. Keith (1949), Hewitt (1963), Powell and Klugman (1979), and Klugman and Yen (1980) have investigated the silica potential of southeastern Ontario, and have suggested that the rocks in the area of the Mohr quarry near Almonte have a high silica potential (Powell and Klugman 1979, p.10).

The March and Oxford Formations are quarried for use as aggregate, presently licensed operations are the Carleton Place quarry of Duffy Road Oiling Limited (Ramsay Township, concession VIII, lots 2 and 3) (Rogers 1980, p.36-38; Rogers 1981); and the Franktown quarry of Thomas Cavanagh (Beckwith Township, concession II, lot 16). The Rockcliffe Formation is quarried for use as aggregate; the only presently licensed operation are the Ashton quarry of Thomas Cavanagh (Beckwith Township, concession VIII, lot 24). The Bobcaygeon Formation is also quarried for use as aggregate, the only presently licensed operation is the Ashton quarry of Allan MacMillan (Huntley Township, concession XI, lot 1). Three aggregate quarries could be located within the March, Oxford, Gull River, and Bobcaygeon Formations. The March Formation is a source of skid-resistant aggregate; but alkali-reactive beds in the Gull River and Bobcaygeon Formations are unacceptable for use as concrete aggregate (Rogers, 1983).

Post-Ordovician calcite-fluorite-barite-celestite-galena-sphalerite-chalcopyrite veins, striking east to southeast, occur in southeastern Ontario. The only known occurrence within the Carleton Place map area is the Ramsay mine (Logan 1863, p.688-689; Alcock 1930,p.140-141), hosted by the March Formation; minor lead production has come from a vein located in Ramsay Township on concession VI, lot 3. The vein strikes east-southeast, and has been traced for 200 m. A parallel vein occurring on concession VII, lot 3 has been traced for 700 m. The veins, which have an average thickness of approximately 1 m and consist of calcite and galena with minor sphalerite and chalcopyrite, branch from a fracture zone 15 m wide which strikes east-west and contains southeast-striking calcite-galena veinlets up to several centimetres thick.

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SYMBOLS

- Bedrock outcrop
- Geological boundary, position approximate
- Fault, position approximate; arrow indicates downthrown side
- Quarry
- Drillhole, with reference number *
  - CH = CP-1 OMNR L-C
  - CP-2 OMNR L-D
  - CP-3 OMTC Carleton Place 28, Nos. 1 and 2

*Reference numbers:

CREDITS

Geology by D.A. Williams and R.R. Wolf, 1982.

Every possible effort has been made to ensure the accuracy of the information presented on this map; however, the Ontario Ministry of Natural Resources does not assume any liability for errors that may occur. Users may wish to verify critical information; sources include both the references listed here, and information on file at the Resident or Regional Geologist's office and the Mining Recorder's office nearest the area.

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Information from this publication may be quoted if credit is given. It is recommended that reference be made in the following form:

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1984: Paleozoic Geology of the Carleton Place Area, Southern Ontario; Ontario Geological Survey, Map P. 2725, Geological Series–Preliminary Map, scale 1:50 000. Geology 1982.

Ministry of Natural Resources
Ontario

Hon. Alan W. Pope
Minister

John R. Sloan
Deputy Minister

ONTARIO GEOLOGICAL SURVEY
MAP P. 2725
GEOLOGICAL SERIES – PRELIMINARY MAP

PALEOZOIC GEOLOGY
CARLETON PLACE AREA
SOUTHERN ONTARIO

Scale 1:50 000

Mile 1 0 1 Mile
Metres 1000 0 1 Kilometre

NTS Reference: 31F/1
ODM–GSC Aeromagnetic Map. 12G
OGS Geological Compilation Map: 2418

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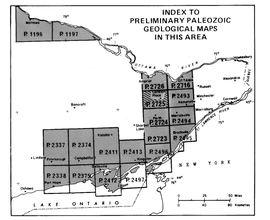
INDEX TO PRELIMINARY PALEOZOIC GEOLOGICAL MAPS IN THIS AREA



LEGEND

PHANEROZOIC
PALEOZOIC

UPPER ORDOVICIAN

13 Queenston Formation*: red to light greenish grey siltstone and shale, with interbeds of silty bioclastic limestone in lower part

12 Carlsbad Formation*: interbedded dark grey shale, fossiliferous calcareous siltstone, and silty bioclastic limestone

11 Billings Formation*: dark brown to black shale, with laminations of calcareous siltstone

10 Eastview Formation*: interbedded sublithographic to fine crystalline limestone and dark brown to dark grey shale

MIDDLE-UPPER ORDOVICIAN

9 Lindsay Formation*: sublithographic to fine crystalline limestone, nodular in part, with interbeds of calcarenite and shale

MIDDLE ORDOVICIAN

8 Verulam Formation* interbedded bioclastic limestone, sublithographic to fine crystalline limestone, and shale

7 Bobcaygeon Formation: interbedded calcarenite and sublithographic to fine crystalline limestone

6 Gull River Formation: interbedded silty dolostone, lithographic to fine crystalline limestone, oolitic limestone, shale, and fine-grained calcareous quartz sandstone

5 Rockcliffe Formation: interbedded fine-grained light greenish grey quartz sandstone, shaly limestone, and shale; locally conglomerate at base; interbeds of calcarenite (St. Martin Member, 5a) and silty dolostone in upper part

LOWER ORDOVICIAN

4 Oxford Formation: sublithographic to fine crystalline dolostone

3 March Formation: interbedded quartz sandstone, sandy dolostone and dolostone

CAMBRO-ORDOVICIAN

2 Nepean Formation: fine-to coarse-grained quartz sandstone, partially calcareous in upper part

1 Covey Hill Formation*: noncalcareous, feldspathic, fine- to coarse-grained quartz sandstone and quartz-pebble conglomerate

UNCONFORMITY

PRECAMBRIAN

PC Undifferentiated metamorphic and igneous rocks

*This unit does not outcrop in this map area.

SOURCES OF INFORMATION

Base map from Map 31F/1 (Carleton Place) of the National Topographic Series.

Subsurface information mainly from Ontario Ministry of Natural Resources Oil and Gas Well Summary Cards (on file with the Petroleum Resources Section, London, Ontario).

Magnetic declination approximately 12°20'W in 1982.

Contour interval: 25 feet.

Metric Conversion Factor: 1 foot = 0.3048 m